WASHINGTON WATER UTILITIES COUNCIL
GUIDE FOR WATER UTILITY MANAGERS AND GOVERNING BODIES
ON RESIDENTIAL FIRE SPRINKLER SYSTEMS
OCTOBER, 2008

1. Background

The drafting of this guide to addressing residential fire sprinkler issues for water utilities was initiated in response to State legislation directing creation of a group to address barriers to the voluntary use of residential fire sprinkler systems (RFSS). Recently, it appears that fire sprinklers may become mandatory in all new residential structures within two years. There are many more facets to fire safety than this singular issue of setting utility service policies for installation of fire sprinklers in single-family and duplex residences; however, they are beyond the intended scope of this document.

1.1 Legislative Action

After a few years of debate on the issues involved with installation of RFSS in new single-family and duplex homes, the Washington State Legislature adopted Substitute House Bill 2575 in the 2008 session; and, it was subsequently signed into law by the Governor. This legislation directed the State Building Code Council to convene a technical advisory group (TAG) to examine issues and report to the legislature at the beginning of the 2009 session on the barriers to voluntary installation of residential fire sprinklers. This broad group representing local government, water utilities, building officials, state agencies, fire protection, insurance companies, sprinkler installers, architects, and builders was completing its report in the fall of 2008 when the International Code Council (ICC) adopted a resolution inserting language in the model code to make fire sprinklers mandatory in new residential construction. Thus, while most of the policy and other work on these issues in Washington have addressed voluntary residential fire sprinkler installations, it may now be necessary to address these issues with the assumption that such systems will be mandated in new construction within the next two years. The typical process for ICC model code changes to find their way into the State code is through Building Codes Council rule-making (2009) and delayed adoption until completion of the next legislative session (2010).

1.2 Barriers Report

The TAG report on barriers to installation of RFSS identified seven key barriers, five of which include some aspect of the provision of water service to the systems. These five barriers are: 1) lack of preferred design and installation details and guidelines, 2) cost and cost recovery of a voluntary RFSS, 3) increased cost of hook-up fees in form of stand-by/system development charges, 4) shut-off issues, and 5) water use efficiency rule credit for use of larger meters. Addressing some of these issues will require legislation or rule-

making by the state and others can be addressed by utilities through their locally adopted policies.

1.3 Significance to Water Utilities

This document is intended to provide a guide to water utility managers and their governing bodies to help them identify relevant issues and compare options in addressing these issues as they establish policies governing the provision of residential fire sprinkler system (RFSS) service. Key issues identified by the Washington Water Utilities Council (WWUC) to be addressed in water utility policies include water quality, type of service to be provided, customer charges and service issues, liability, and other utility-specific issues.

Whether mandatory or voluntary, water utilities can expect to see an increase in demand for RFSS installations and need to have a policy framework in place for this service. It would be preferable, though not entirely necessary, for utilities in Washington to adopt reasonably consistent policy approaches. However, because of the variety of water utilities' governing bodies' structures it may not be possible to achieve a high level of state-wide policy consistency, in spite of the pressure to do so by builders and sprinkler system installers. This is an issue for future discussion by the WWUC; and, if RFSS become mandatory nation-wide, it will eventually lead to standard-setting on at least some issues by AWWA.

All of the policy choices presented here are interconnected. As a result, policy options in one area should be examined in light of the consequences or limitations that would confront a utility in other areas. This analysis does not readily lend itself to a linear approach.

2. Water Quality Protection

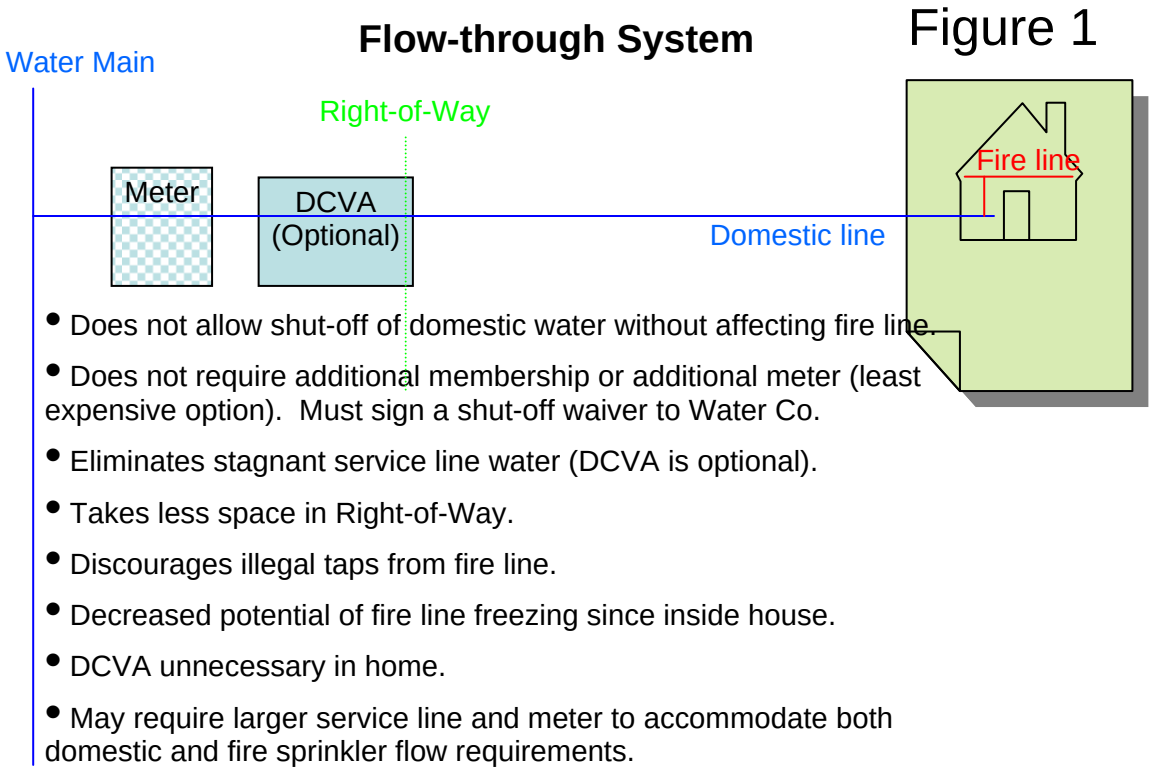
The most significant concern for many water utilities with regard to any fire sprinkler system is protection of water quality. Because dedicated fire-line systems are dead-ends where water can stagnate, water purveyors have typically required that they be isolated from the potable water supply with an approved backflow prevention method (most often a double check-valve assembly – DCVA) to protect the water system from backflow of this poor-quality water. For small residential systems, some utilities have opted for a flow-through system design to eliminate dead-ends and, potentially, avoid the need to require backflow prevention.

2.1 Flow-through Systems

As depicted in Figure 1, a flow-through system uses the same water service and household plumbing to supply the fire sprinklers and the various domestic water uses in a home. Policy examples from the Mountain View-Edgewood Water Company and the City of Tacoma favor flow-through systems, primarily due to the elimination of dead-ends and the cost savings associated with using a single service line and meter to serve both domestic use and fire protection.

Key issues to address include whether to require backflow prevention on flow-through systems (as in Mt. View-Edgewood which requires a DCVA on all services to protect their non-chlorinated supply) or to waive it (as in Tacoma which requires all in-home fire sprinkler piping to terminate at a fixture getting regular domestic use to insure flow through all parts of the in-home system).

Also, in-home plumbing needs to be a larger diameter than normally used to serve only domestic uses which may mean greater loss of chlorine residual at points of use due to longer residence time for the water within the warmth of the home; and, if copper piping is used, a greater potential for copper corrosion, affecting Lead and Copper Rule (LCR) compliance.



2.2 Dedicated Fire Sprinkler Service

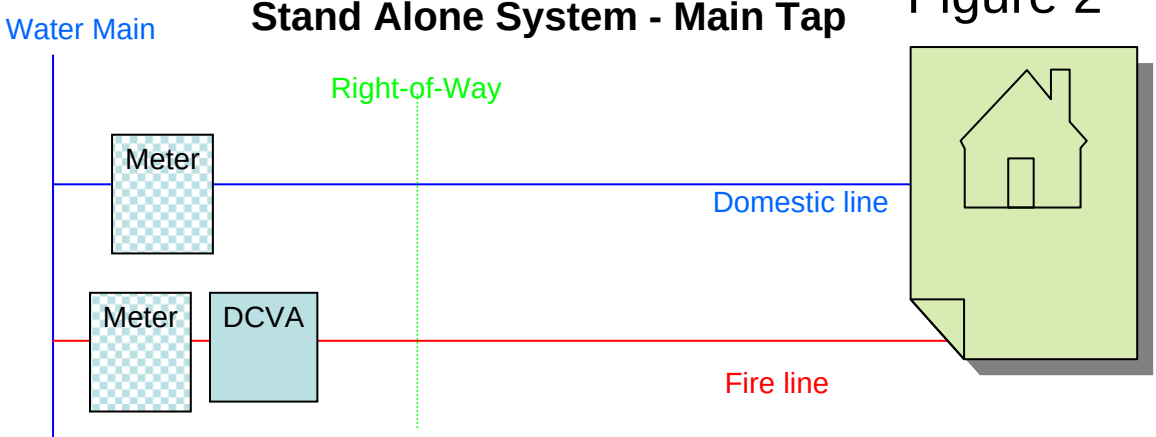
Four variations on the concept of a dedicated fire sprinkler service line have been identified: 1) a complete separate service line from the main, 2) a branch off a single service line before the domestic meter, 3) a branch off a single service just after the domestic meter, and 4) a branch off the service line inside the home.

2.2.1 Separate Service (Figure 2)

A separate service from the main is the method favored by Spanaway, Lakewood, and Covington. Because of the large amount of piping containing stagnant water, backflow prevention is required (DCVA is standard but Spanaway may also require a reduced-

pressure principle backflow assembly – RPBA - if there is potential of a higher hazard use, such as the addition of chemicals to the fire system). In this configuration, a standard domestic service is installed for all non-fire uses, providing a normal flow and water quality scenario.

Figure 2

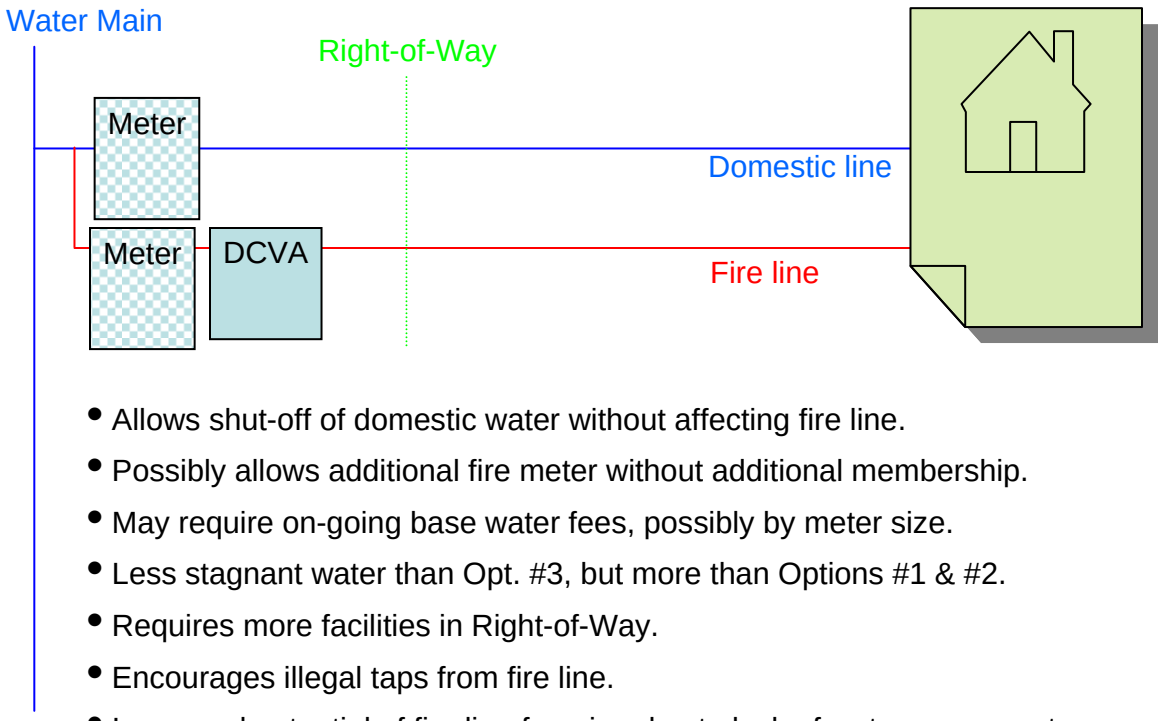


- Allows shut-off of domestic water without affecting fire protection.
- Allows purveyor to use smaller meter sizes for WUE purposes.
- May require additional membership fee, 2nd meter fee, and base fees.
- Creates stagnant water for Fire line (between main and DCVA).
- Requires more facilities in Right-of-Way.
- Encourages illegal taps in fire line (infrequent meter reads; enforcement actions more likely).
- Increased potential of fire line freezing due to lack of water movement.

2.2.2 Fire Line Branch Before Domestic Meter (Figure 3)

This configuration requires a larger service in the street up to the branch (just before the meter); and, then uses separate service lines on the customer's property to supply domestic use and the fire sprinklers. As for a complete separate service, backflow prevention is required on the fire supply at the point where it branches from the single service line (DCVA, typically). There is a slightly greater potential for water quality degradation compared to a standard domestic-only service due to the use of a larger service in the street.

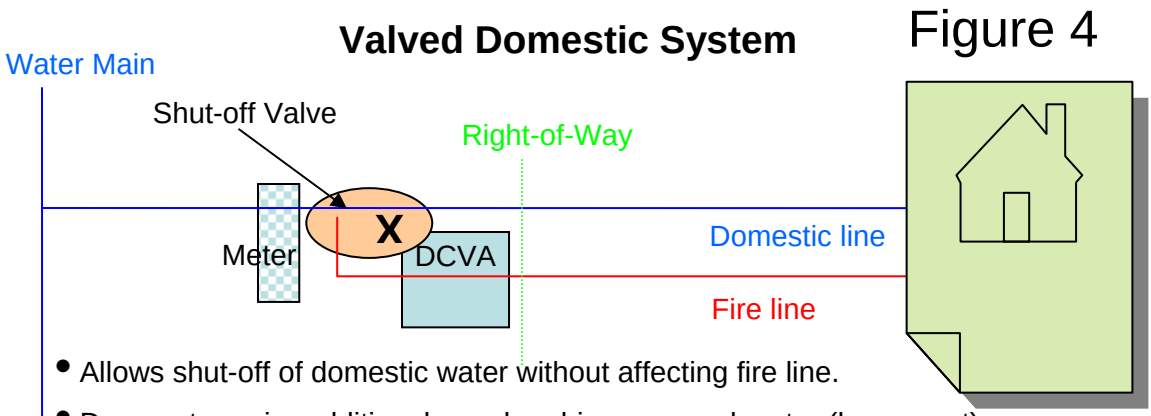
Stand Alone System – Domestic Tap Figure 3



- Allows shut-off of domestic water without affecting fire line.
- Possibly allows additional fire meter without additional membership.
- May require on-going base water fees, possibly by meter size.
- Less stagnant water than Opt. #3, but more than Options #1 & #2.
- Requires more facilities in Right-of-Way.
- Encourages illegal taps from fire line.
- Increased potential of fire line freezing due to lack of water movement.

2.2.3 Fire Line Branch After the Meter (Figure 4)
This configuration (not favored, but allowed by Mt. View-Edgewood) uses a single service in the street and a single meter with the fire line branching just after the meter and using a separate service on the customer's property. A special branch fitting with a shut-off valve fits in the meter box on the customer's side of the meter. As above, backflow prevention is required at the point where the branch line for the service takes off just past the meter. Water quality impacts would be minor, the same as for a fire line branch upstream of the meter. The main advantage of this configuration is the ability to terminate domestic use without terminating fire system use, while protecting water quality.

Figure 4



- Allows shut-off of domestic water without affecting fire line.
- Does not require additional membership or second meter (lower cost).
- Eliminates stagnant service line water.
- Takes less space in Right-of-Way than dual main connections.
- Illegal taps of fire line are still metered, eliminating enforcement actions.
- May require larger service line and meter to accommodate both domestic and fire sprinkler flow requirements.
- Stagnant water in fire-only line and risk of freezing.
- Water Use Efficiency Rule is an impediment to adopting this system.
- DCVA for fire line should be used (some may prefer after meter).

2.2.4 Fire Line Branch Within the Home

A configuration similar to a flow-through system results if the fire line branches at the service entrance to the home, providing a fire sprinkler line in the home separate form the domestic water piping. This is not a flow-through system, though some may describe it that way. While the amount of piping containing stagnant water is greatly reduced in this configuration compared to any of the separate-service options, it still presents the same water quality concerns. The question for the water supplier is whether to require premises isolation (typically a DCVA at the meter), backflow prevention in the home on the fire line, or to waive requiring backflow prevention due to the decreased risk of contamination to the water system (though not to the customer). Any potential savings in the cost of interior piping would likely be lost in the cost of installing and annual testing of a backflow assembly. Water quality impacts due to larger piping, if any, would be similar to a flow-through system. One possible approach to reduce the need for over-sizing the service piping may be to require installation of a solenoid actuated valve on the domestic line just past the branch point that would be activated by flow on the fire line to shut off any domestic demand if there is a fire demand.

2.3 Backflow Prevention

Current state standards are clear that any configuration employing a separate fire service line requires an approved backflow assembly be installed to protect the public water supply. Typically, for gravity flow systems a DCVA is required. However, if booster

pumping is used to increase pressure above the supply pressure or if chemicals are added to the fire system (such as corrosion inhibitors) then an RPBA is required. If backflow assemblies are routinely installed, is annual testing and maintenance part of the utility service cost (Mt. View-Edgewood) or an additional expense to the customer and an administrative (enforcement) burden on the utility (typical approach for most utilities today)?

Flow-through systems can be constructed in such a way as to avoid this requirement by designing them without dead-end pipe runs serving fire sprinklers. Tacoma requires each line serving a fire sprinkler to terminate at a fixture that is expected to get regular use for domestic purposes and requires that the premises water piping pass a utility inspection for this purpose. This is an added step for Tacoma and other utilities, which have not typically inspected interior plumbing, except for commercial and industrial uses where backflow protection is a consideration. It may be appropriate in such systems to also limit the length of pipe branch off a supply line to serve an individual sprinkler head.

3. Service Provision Options

Water utilities use an array of hardware when installing a customer service connection. This section addresses questions and issues regarding changes from a utility's standard approach that could be needed in providing fire sprinkler service in single-family homes and duplexes. Service pressure and flow issues are addressed as well as service line size, meters, and related service provision features.

3.1 Service Line Size

When providing separate domestic and fire services from the main, a standard size domestic service is used, and the fire sprinkler service is sized based on fire-only flow requirements. However, where a single service tap will supply both domestic and fire service use, it may be necessary to use a larger service line than for a domestic-only service, at least up to the point of a branch to a separate fire service line.

The utility's decision to install a larger than standard service line (for example, a one-inch line when three-quarters-inch is the standard single-family service size), will include consideration of several factors:

a. Fire sprinkler design flow (minimum of 26-30 gpm) at design pressure (minimum of 20 psi)
b. Typical range of operating pressures in the water system
c. Length of utility service line (and length of service from meter to house)
d. Elevation change from street to house
e. Potential increase in peak demand (cumulative) on the water system
f. Cost of service installation and utility fees

A utility may have high enough service pressures that the minimum flow and pressure for fire sprinklers can be met through a ¾" service line. However, most utilities that have addressed policies for single-line service to both domestic and fire sprinkler use have determined that they need to use a larger service line, such as a 1" line. Extenuating

circumstances such as low water distribution pressure, a long distance from the street to the house, or significant changes in elevation from the street to the house may require even larger service line sizes to deliver minimum fire flows. Since service fees (Capacity charges, Memberships, Development fees, etc) are typically based on service and meter size, keeping the service size to a minimum may be a goal of the utility and the customer, in which case the utility may favor allowing or requiring, if possible, the installation of a larger size service line on the customer's side of the meter to make up for the greater friction loss through a smaller service supplying the meter. For most utilities the sizing of the standard service line and meter is, in part, a means to limit peak demands on the system; and, increasing the size of a single-service configuration to address fire sprinkler flow allows the potential for a greater peak demand. This potential, or its cumulative effect, is a key concern for those utilities that have chosen the two-service configuration, keeping the domestic service at a smaller size from the main to the house.

3.2 Meter Size and Type

Issues related to meter sizing are similar to those for service lines, though the role of meters as the means of measuring use for billing and other purposes makes their accuracy an additional area of concern. For configurations in which the fire line does not use water that passes through the domestic meter, the issue of increasing the domestic meter size does not arise. One question for the utility to address in these configurations is if a meter will be required on the fire sprinkler service. While it is common for utilities to install detector-check type meters on larger fire services, some have suggested that RFSS service lines not be metered since meters of this type are not produced in such small sizes and the pressure drop at high flow through standard small displacement type meters is significant. In general, utilities have opted to meter the separate fire service so that any unauthorized use can be detected; however, see the discussion below on meter types for an explanation of the importance of this decision. Illegal connections to fire lines are not uncommon and pose an enforcement problem to water purveyors who are not also the "authority having jurisdiction".

For service configurations that serve both the domestic and fire use through a single meter, it is unlikely that a standard 5/8" X ¾" meter will pass the fire flow at a reasonable pressure loss; however, there may be unique local conditions that allow for this approach. More commonly, utilities install full ¾" or 1" meters in such configurations, depending on the utility's evaluation of the factors presented above under the discussion of service size. Both Mt. View-Edgewood and Tacoma, have adopted as the standard a combination of a 1" service line and a full ¾" meter as a cost-effective compromise between instantaneous capacity and ability to measure low flows.

The advantage to utilities of a smaller domestic meter is the ability to accurately measure flow through the meter, and to measure at all, the lowest flows. All meters require a minimum amount of flow (or water velocity) to make them register flow. In general, as the size of the meter increases this minimum flow to start the meter turning also increases. A considerable amount of domestic use is at low flows; and, the ability to detect leaks is very dependent on the ability of a meter to detect small flows. High flows are also more accurately measured by smaller meters than by larger meters. This becomes

an important factor also in reporting system leakage to the State Dept. of Health under the new Water Use Efficiency (WUE) Rule, since metering losses are part of the definition of system leakage and are frequently a large portion of the overall losses in a water system. Thus, use of larger domestic meters will lead to increased losses in revenue and a higher reported system leakage number. These issues are important to examine in selecting the type of RFSS service provision to provide, especially with regard to using one or two meters for the two purposes.

The issue of the use of "fire-rated" water service components is addressed more thoroughly in the later section on liability. With regard to meters in the size range for RFSS use, only one manufacturer has been identified so far that is producing a listed meter that meets the open flow-path requirements of a fire-rated meter. This is obviously going to be a problem if rated meters are required when State codes are adopted. So far, however, the use of standard water service meters has been considered reasonable by all parties, in spite of concerns about possible plugging of the displacement-type meters or their built-in screens. A typical fire-rated meter is a proportional-reading meter that directs a portion of the flow through the metering chamber while leaving the main flow path unobstructed. Of course, some metering accuracy and low-flow capability is typically sacrificed with this approach. The challenge for utilities is to weigh the small possibility of a meter plugging or stopping against the relative accuracy of measurement of the meter types and sizes being considered (perhaps also a small difference). Most utilities standardize on one or two brands of meters to keep their stock of spare parts under control, relying on the large number of suppliers available to keep prices competitive; if a fire-rating is required and there is no competition in supplying meters for RFSS service then higher prices should be expected. Many utilities have converted to Automated Meter Reading (typically, radio-read meters) technology, which is not offered in fire-rated styles. Additionally, the fittings used in domestic meter settings are not fire-rated.

3.3 On-site Storage

In rural areas (where water systems are frequently not designed to deliver fire flows or to serve fire hydrants) it may not be possible to serve a RFSS without providing storage on-site. This is the standard approach for service to homes from individual wells, using captive-air pressure tanks to provide storage to reduce the cycling frequency of the well pump and to provide a small reserve in the event of power failure. On-site storage may also make sense where an extremely long service line is needed to provide service to the home from the point of connection to the main as a means to get by with a smaller service line.

The sizing of the amount of storage presents a trade-off between providing adequate flow for an adequate period of time to meet the goal of fire control while keeping the stored water sufficiently refreshed with regular use to maintain water quality, assuming a single supply for fire and domestic uses in these situations. If the storage is provided just on a separate line serving the RFSS then the water quality issues are moot, provided there is adequate backflow protection provided.

3.4 Booster Pumps

Hilltop properties have great views and the lowest water pressure. If the number of customers on a particular hilltop is small, utilities frequently opt to allow service at lower than usual pressure, subject to the customer (or utility) installing a booster pump to provide adequate pressure to the home. If this same service connection and booster pump is also serving the RFSS then it needs to be sized to serve the required fire flow also.

In some cases the service pressure may be adequate to serve the domestic uses but not adequate to meet the minimum pressure requirements (or flow) for the RFSS, in which case a booster pump may be installed on only the fire service (where they are separate) or on the whole house service but only called to run when pressure drops below a minimum level. If a booster pump is used in such a standby situation, routine testing would be needed to insure it is operating properly when needed. Utilities may find that booster pumping is needed, as a retrofit, when sprinkler systems are designed and installed assuming that distribution system pressures are greater than actually occur during periods of high demand.

3.5 Pressure Reducing Valves

Where service pressures are higher than recommended for domestic service it is common to install a pressure reducing valve (PRV) on the domestic service at the entry to the home to protect in-home plumbing fixtures and appliances. In flow-through systems a PRV can represent a flow restriction significant enough to limit the delivery of adequate flow to the RFSS sprinkler heads. This is especially a concern when the PRV (as is often the case) is fitted with a strainer which would be subject to plugging with debris over time. In situations where service pressures are high enough to normally call for installation of a PRV on the domestic service a separate fire service may be preferred or installation of a branching system where the fire line branches before the PRV. The branched line in a configuration where the branching is after the domestic meter can be required to terminate in a fixture with regular use that is individually protected by a PRV at the point of use to insure flow through the fire line (Bremerton).

3.6 Significant Increase In Customer Peak Use

If major additions are made to the customer's plumbing to supply added uses after the service for a flow-through or branching RFSS configuration has been installed, especially a large-demand use such as an automatic irrigation system, it may limit available flow to the fire sprinkler heads. This factor may favor consideration of further service line and meter size increase in flow-through or branching systems or favor consideration of separate service systems. This is another potential impact on utility liability defense, even though it is not likely that the utility would be made aware of the modification to the customer-side plumbing and resulting demand increase.

4 Customer Service Issues

Customer service issues include up-front fees, monthly service rates, routine service interruptions, shut-offs for non-payment, backflow device annual testing and maintenance, customer notifications, and utility regulations.

4.1 Development Charges, Capacity Fees, and Membership Fees

Most utilities have some kind of fee that a new customer pays that is based on obtaining equity in the system relative to existing customers. They are called System Development Charges, Connection Fees, Membership Fees, Capacity Charges, etc. and are distinct from the service installation charge that is generally based on the cost of the actual construction of the new service connection. Sometimes the fees, or portions of them, are based on property frontage; but, most often, they are based on the service and meter size or anticipated customer use (impact on the system). A key question for utilities regarding application of such fees is whether they see the additional capacity required to serve the RFSS as imposing an additional demand on the system for which an increased or additional fee should be charged. In some cases the over-sizing to serve the RFSS (Lacey) or the additional service for a separate RFSS service is charged the standard fee based on service size. Some other utilities have adopted an incremental increase in the standard single-family capacity fee (Kitsap PUD) when the service provision also includes a RFSS. Some utilities have also waived any increase in fees associated with over-sizing for the RFSS (Tacoma always and Camas – only when the RFSS is required by the City) or even for a second service if it is only for the RFSS (Spanaway and Covington) when it accompanies a new domestic service. Some utilities have expressed concerns that when some portion of the service uses a common service line and there is an automatic irrigation system installed on the property, the over-sized portion of the service line may allow a higher peak irrigation use than would normally be possible, resulting in a greater potential peak demand on the water system for which a higher system capacity fee may be appropriate. Some mutual water companies (Mt. View-Edgewood) charge a membership fee for every service connection, including separate fire service connections to the main.

4.2 Service Installation Fees

The issues around application of service installation fees are whether to charge the full additional service installation fee for a second service when a dedicated fire service line is installed (Lacey) or a reduced fee (Lakewood, Covington) when they are installed at the same time. Similarly, when a common service connection and line (up to some point) is serving both domestic and fire use is the installation charge based on the larger connection (Lacey), at some incremental increase over the normal domestic service charge (Mt. View-Edgewood – at $450), or at no increase over the standard domestic service installation cost (Camas, when RFSS required by City)? While capacity charges are somewhat subject to assumptions about usage patterns for the residential customer, the service installation fees are typically based on actual costs experienced by the utility for such installations; so, where over-sizing or additional service lines are involved it would seem appropriate to consider whether to recover these costs from the new customer or to absorb them into the rate base.

4.3 Monthly Rates

With multiple service lines from the main to serve domestic and RFSS use separately, it may be necessary to set up two customer accounts (Spanaway and Lakewood) with the resulting minimum monthly charges for service to each. Covington applies an incremental fee to the standard domestic bill for the separate fire service (currently $25 per month). With a branching service or flow-through system some utilities apply an additional incremental fixed monthly service charge (Kitsap) or at the higher rate associated with the larger meter installed (Tacoma).

One major concern for water utilities is the possibility of a customer making a connection to the fire service line in a two-service configuration or a branching configuration, either by mistake or intentionally, and taking water from the fire service. As a result, penalties may be considered (Spanaway at 12X normal commodity charge when domestic service is shut-off for non-payment), in addition to normal fees for water use. It appears that the standard for separate service to a fire line of all utilities responding to the survey is to install a meter on the dedicated fire line to detect any unauthorized flow, unless the branching line comes off the single service after the meter. The trade-off for utilities on this issue is the cost of two meters and services (with a separate fire line) and the cost of enforcement actions, compared to the cost of a larger meter and service up to the point of branching, and the potential for greater under-registering of low flows by the larger meter.

4.4 Service Interruptions

A significant concern of utilities is how to handle service interruptions, planned or otherwise, when the homeowner is assuming and depending on continuous water service to provide fire protection to the premises. Liability issues will be addressed later; the focus here is on customer notification and related obligations, if any, of the utility. Three general categories of system service interruptions include: 1) emergencies such as main breaks or other major system component failures, 2) construction of system extensions, replacements, or improvements that may require shutdowns to make connections or such, and 3) routine system maintenance activities, such as flushing, that impact service to the customers. Clearly, there are rarely opportunities to anticipate and notify customers of system failures or other emergencies; so, there is not likely to be any way to provide any additional notice to fire service customers. With regard to notice of planned shutdowns for construction or system maintenance, however, it may be necessary for the utility to consider establishing procedures to insure notice of these shutdowns to fire service customers and to encourage them, in such notices, to flush their fire sprinkler supply lines when there may have been a possibility of sediment accumulation as a result of the system repairs, flushing, or other maintenance activity. Since all RFSS installations are associated with a domestic service, it may be sufficient to provide the normal notice of planned interruptions (as for Tacoma flow-through systems), adding any appropriate fire-system specific suggestions for the customer.

4.5 Shut-off For Non-payment

Shutting off the water service to enforce payment of past-due billings is the preferred method of most water utilities; and, many consider it the only effective way to get the attention of some customers. Some utilities believe they should attempt to provide uninterrupted service to the RFSS, even in the event of failure to pay for the service. When a single water service supplies both the RFSS and domestic uses, a non-pay shut-off could affect the RFSS as well as the household uses. This concern is a factor in the selection by some utilities (Spanaway and Lakewood) of the configuration employing a separate fire service from the main. It is also a consideration favoring the branching configurations where the fire line branches at the meter, as long as a separate shut-off valve is provided on the domestic service line. Utilities may want to consider simultaneous notice of shut-off that affects the RFSS as well as the domestic service to the local fire department.

Flow-through systems and those that branch off a fire line inside the home do not allow for keeping the RFSS supplied while shutting-down the domestic supply. Utilities that have adopted the flow-through configuration (Tacoma) have indicated that the shut-off of the domestic supply gets a quick response, making any shutdown of the RFSS also brief. There is also the concern that a separate fire line, if that service was shut down for lack of payment, may not generate the sense of urgency to get the service reinstated that the loss of the domestic supply achieves. Another concern with a dual service approach is the potential for a customer with the domestic supply shut off to tap the fire supply line to obtain domestic water (until discovered by the utility, note Spanaway's 12X use penalty). Non-municipal utilities may not have the legal authority or the resources to routinely inspect for illegal connections; and, once an illegal connection is discovered they may not have the authority or desire to take legal action.

4.6 RFSS Design Requirements

Larger fire sprinkler systems in commercial and industrial applications and larger multi-family residential applications are required to be designed by a licensed fire system designer and installed under a licensed installer's supervision. Since RFSS installations are currently voluntary, there is no corresponding licensing requirement for system designers and installers of these small residential systems. As a result, it may be appropriate for utilities to consider if they should require design by licensed designers (as in Spanaway). Utilities also may want to develop standard details, as for current residential water service installations, for the service configuration chosen as the utility's standard, including the materials to be used in the installation. To the extent that additional unique service line materials will be employed, the utility may want to limit the options to keep down the array of spare parts that it will need to stock. Given that the plumbing code is the responsibility of general-purpose local governments, utilities that are not part of such a local government entity will need to rely on their water quality protection mandate to allow them to regulate the design and installation of in-home fire sprinkler systems.

4.7 RFSS Required by Utility (or General-purpose Government in Service Area)

Some utilities (or more specifically, the general purpose government in their service area) have required the installation of an RFSS (Camas) in situations where access by fire fighting equipment is limited. These may include homes on very small lots (small side-yard setbacks), homes on "flag" lots where the access is a long narrow driveway, homes on very narrow streets, and homes on mains or in areas served by mains that are too small to serve fire hydrants.

5 Liability

Many water purveyors have expressed concern that the installation of fire sprinklers in single-family and duplex residences presents unique challenges compared to provision of fire service in larger commercial, industrial, and multi-family installations where there is typically someone responsible for maintenance who is familiar with the fire sprinkler system. Large fire system installations are equipped with alarms that indicate if there has been a pressure drop, for example. Household systems are at risk of modification over time by the homeowner, inadvertent valve closures, and changes in utility service pressure and capacity as the area develops over time. With concerns about the expectation of continuous service to the RFSS, utilities have many questions about their liability with regard to RFSS installations. While there is asserted to be general protection in State law for utilities providing fire sprinkler service, the committee that drafted the report on barriers to RFSS installation concluded that specific language in State law protecting utilities under normal conditions of service interruption and disconnects for non-payment would be beneficial to prevent frivolous lawsuits and ease utility concerns.

Some utilities have opted to address liability issues in the drafting of their policies and in their implementation, through the choice of RFSS service configuration. Others (Spanaway) have required the customer sign a waiver when obtaining a new service that includes a RFSS, which is subsequently recorded with the County property records. One question for utilities to consider if they obtain waivers is whether they feel they need to obtain them from each subsequent customer as the property is sold or rented.

At least two utilities have obtained opinions of their legal counsel regarding any special liability or duties imposed on them as a result of providing residential fires service connections and the consequences of service interruptions, whether for utility operations and maintenance or for enforcement of collection of bills. Unfortunately, or fortunately, RFSS duty issues have not been addressed by specific cases in Washington. In general (and utilities should seek the opinions of their own counsel), the opinions have stressed the need to carefully follow the utility's established shut-off notice procedures, perhaps supplemented by obtaining a customer waiver (which may or may not be of significant value), and providing notice where possible of routine maintenance shut-downs. However, there is caution expressed at the uncertainty of case law since there are no specific precedents and there is caution advised to follow established utility policies, especially given that utilities operate under a variety of enabling statutes.

6 Other Issues

A few additional questions have been raised by utilities during the course of discussions about service to RFSS installations. This is not a complete list of such questions; but, an attempt to collect those identified so far.

Does the installation of RFSS impact the sizing of water mains or other water system facilities, particularly if they will be mandated and new subdivisions will be constructed with all homes having a RFSS? Where urban and suburban utilities have typically designed systems to provide sufficient flows to serve fire hydrants for fire fighting, some have suggested that with universal use of RFSS it may be possible to forego the installation of fire hydrants in such neighborhoods, resulting in smaller mains, pump stations, storage tanks, etc. In rural areas where systems are frequently designed to only provide domestic supplies, the opposite situation may result from the need to provide a higher peak capacity (though smaller than needed to serve fire hydrants) for the instantaneous demand of a RFSS, causing the installation of larger mains, storage tanks, and pumps. In some fire jurisdictions (Mt. View-Edgewood/Pierce County Fire District 8) the Fire Marshall is requiring hydrants be installed within 600 feet of a new home as a building permit condition. Alternatively, the builder is given the option of installing a RFSS in lieu of the hydrant installation. The unintended consequence is that as a water system develops, new areas may not have hydrants to use for fighting vehicle fires, brush fires, or fires at homes without fire sprinklers, among others.

Another area of concern is the potential for a RFSS to need a greater minimum operating pressure than is currently available in some parts of utilities' service areas. This could lead to installation of small booster pumps by utilities and the creation of new hilltop pressure zones at a considerable expense. It could, alternatively lead to numerous individual booster pumps installed on services, whether treated as a part of the utility service or as a part of the homeowner's service, with the additional O&M cost that the booster pump implies.

In the opposite case, where system pressures are high enough to require installation of pressure-reducing valves (PRV) on individual services, it will be necessary to insure that the RFSS is served upstream of the PRV or that the PRV will not restrict the flow below the design flow of the RFSS.

7 Comparison of RFSS Service Options

The summary table below is an attempt to capture the main points of comparison and key issues presented in the preceding discussion. It is, of necessity, an oversimplification so is intended more as a guide to the text sections for the issues of most importance or causing the greatest confusion to a particular utility as it sets policy. The relative weighting or significance of each issue will likely vary from utility to utility.

Comparison of Residential Fire Sprinkler System Service Options

	Flow-Through System	Dedicated Service From Main	Service Branch Before Meter	Service Branch After Meter	Service Branch In Home
Cost of Installation - Utility Side	Lowest	Highest	Middle	Middle	Lowest
Cost of Installation - Total	Lowest	Highest	High	High	Lowest
Magnitude of Fees	Middle	High-Mid.	Middle	Middle	Middle
Backflow Prevention Required?	No	Yes	Yes	Yes	Maybe
Stagnant Water in Service in Street	No	Yes	No	No	No
Stagnant Water in Service on Premises	No	Yes	Yes	Yes	Yes
Risk of Freezing	No	Yes	Yes	Yes	No
Ability to Shut-off Domestic Only	No	Yes	Yes	Yes	No
Number of Facilities in R/W	Lowest	Highest	High	High	Lowest
Ability to Detect Use on Fire Line	Yes	If Metered	If Metered	Yes	Yes
Ability to Meter Low Flows	Worst	Best	Best	Worst	Worst
Monthly Charges to Customer	Moderate	Highest	High	High	Moderate
On-going Maintenance by Utility	Moderate	Highest	High	High	Moderate
On-going Maintenance by Customer	Lowest	High	High	High	Moderate
Shut-off Waiver Recommended?	Yes	No	No	No	Yes
Additional demand issues?	Yes	No	Yes	Yes	Yes

Appendices

- Draft Report of RFSS TAG (September, 2008)
- Spanaway Water Company RFSS Policy (with Waiver Form)
- Lakewood Water District RFSS Policy
- Tacoma Water Division RFSS Policy